FIG.1

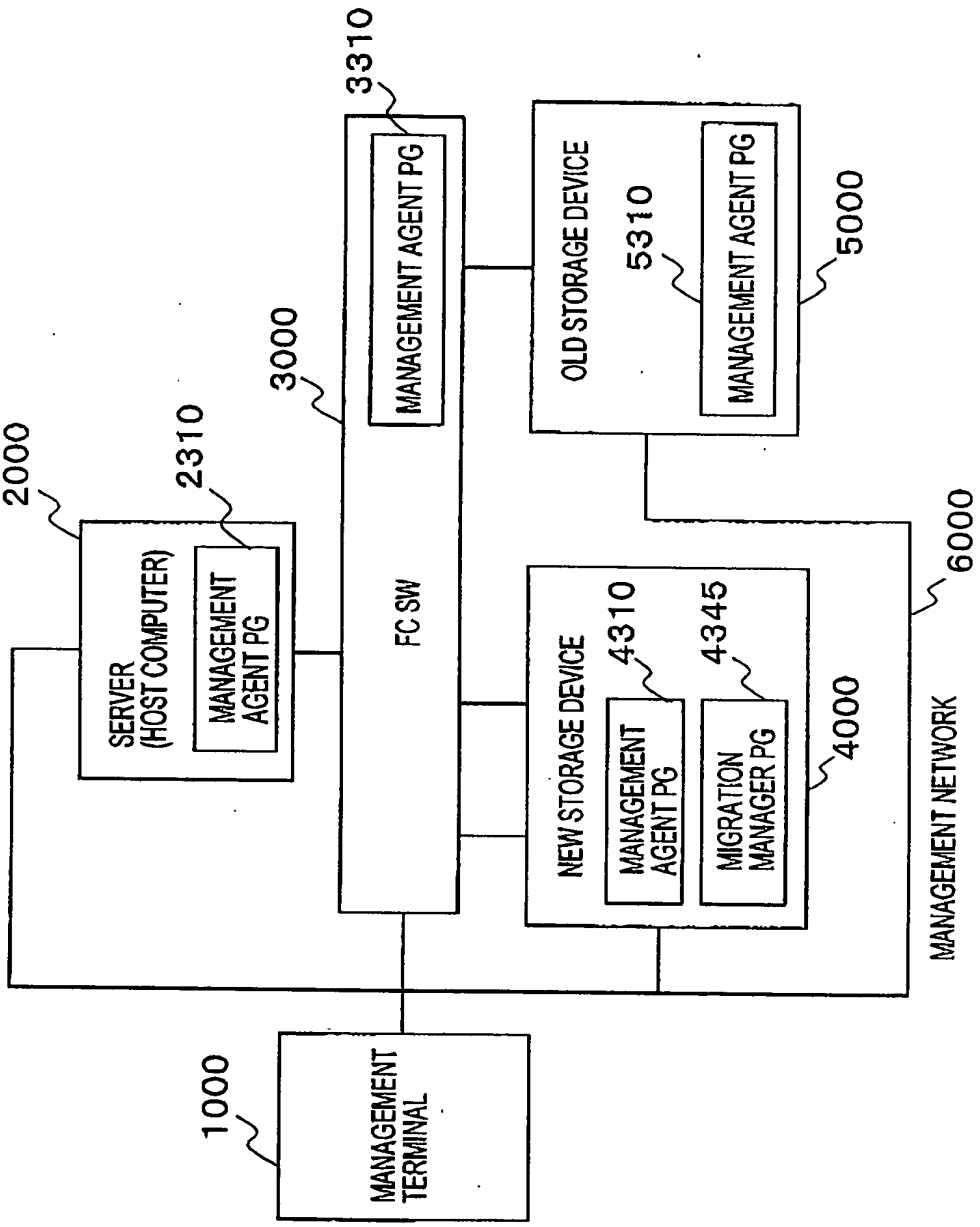

3310
MANAGEMENT AGENT PG
3000
FC SW
2000
2310
SERVER (HOST COMPUTER)
MANAGEMENT AGENT PG
OLD STORAGE DEVICE
5310
MANAGEMENT AGENT PG
5000
NEW STORAGE DEVICE
4310
MANAGEMENT AGENT PG
4345
MIGRATION MANAGER PG
4000
6000
MANAGEMENT NETWORK
1000
MANAGEMENT TERMINAL

FIG.2

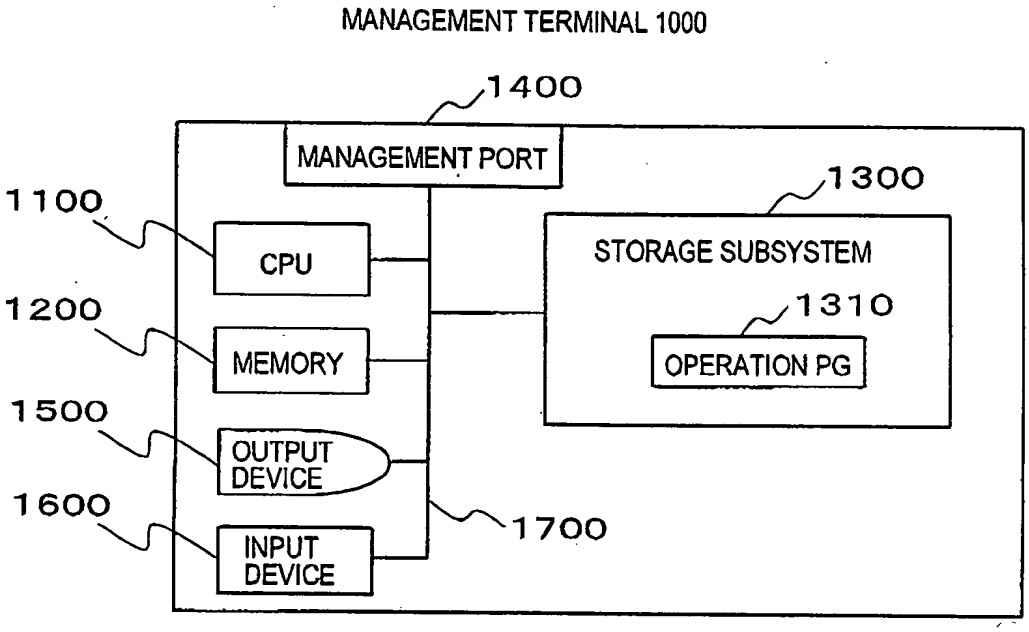

MANAGEMENT TERMINAL 1000
1400
MANAGEMENT PORT
1300
1100
CPU
STORAGE SUBSYSTEM
1200
1310
MEMORY
OPERATION PG
1500
OUTPUT DEVICE
1600
1700
INPUT DEVICE

FIG.3

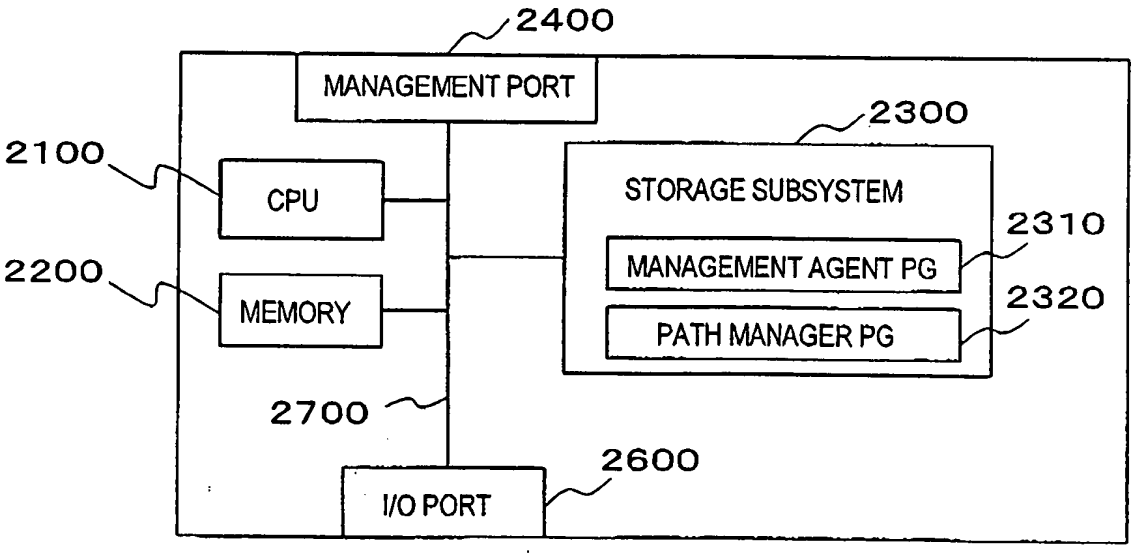

SERVER (HOST COMPUTER) 2000
2400
MANAGEMENT PORT
2300
2100
CPU
STORAGE SUBSYSTEM
2310
2200
MANAGEMENT AGENT PG
MEMORY
2320
PATH MANAGER PG
2700
2600
I/O PORT

FIG.4

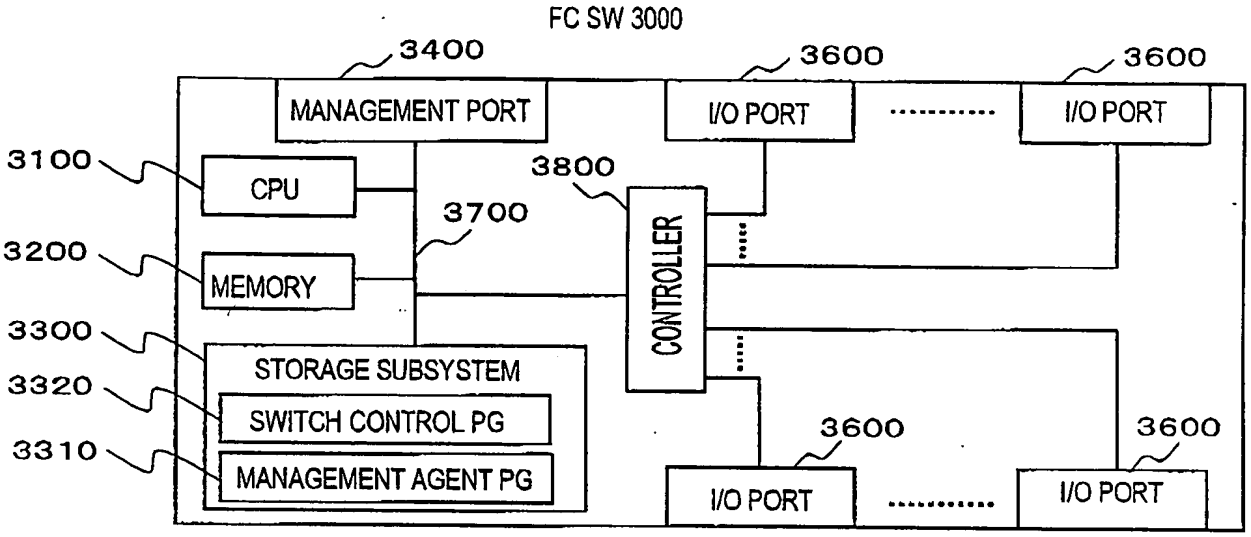

FC SW 3000
3400
MANAGEMENT PORT
3600
I/O PORT
3600
I/O PORT
3100
CPU
3800
CONTROLLER
3700
3200
MEMORY
3300
STORAGE SUBSYSTEM
3320
SWITCH CONTROL PG
3310
MANAGEMENT AGENT PG
3600
I/O PORT
3600
I/O PORT

FIG.5

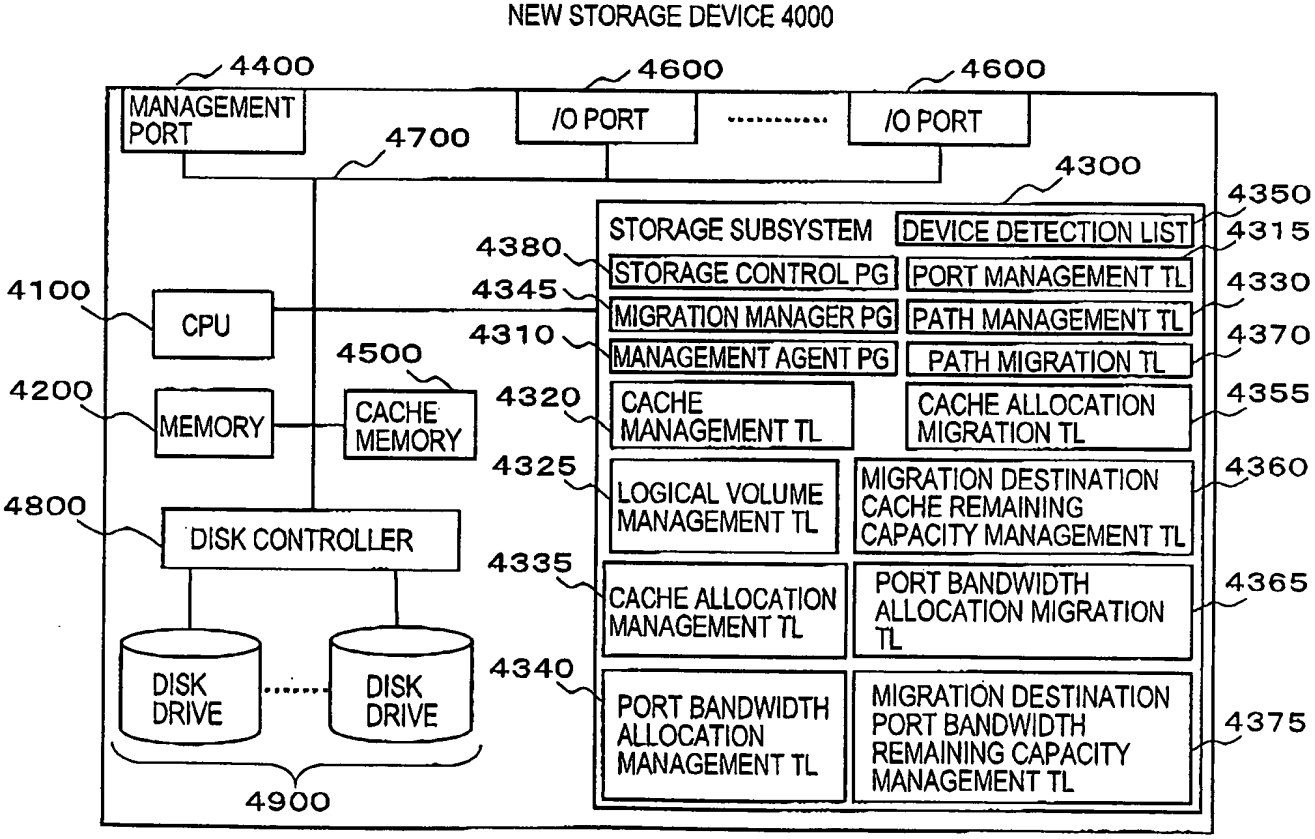

NEW STORAGE DEVICE 4000
4400
MANAGEMENT PORT
4600
I/O PORT
4600
I/O PORT
4700
4300
4350
STORAGE SUBSYSTEM
DEVICE DETECTION LIST
4315
4380
STORAGE CONTROL PG
PORT MANAGEMENT TL
4330
4345
MIGRATION MANAGER PG
PATH MANAGEMENT TL
4370
4310
MANAGEMENT AGENT PG
PATH MIGRATION TL
4100
CPU
4500
4200
MEMORY
CACHE MEMORY
4320
CACHE MANAGEMENT TL
4355
CACHE ALLOCATION MIGRATION TL
4325
LOGICAL VOLUME MANAGEMENT TL
4360
MIGRATION DESTINATION CACHE REMAINING CAPACITY MANAGEMENT TL
4800
DISK CONTROLLER
4335
CACHE ALLOCATION MANAGEMENT TL
4365
PORT BANDWIDTH ALLOCATION MIGRATION TL
DISK DRIVE
DISK DRIVE
4340
PORT BANDWIDTH ALLOCATION MANAGEMENT TL
4375
MIGRATION DESTINATION PORT BANDWIDTH REMAINING CAPACITY MANAGEMENT TL
4900

FIG.6

PORT MANAGEMENT TL 4315, 5315

43151 PORT ID	43152 PORT WWN WWN	43153 SCSI ID	43154 BANDWIDTH CAPACITY	43155 BANDWIDTH REMAINING CAPACITY
port-b1	WWNb1	2	200MB /s	50MB /s
port-b2	WWNb2	3	200MB /s	200MB /s
port-b3	WWNb3	4	100MB /s	50MB /s
port-b4	WWNb4	4	200MB /s	200MB /s
:	:	:	:	:

FIG.7

CACHE MANAGEMENT TL 4320,5320

43201 CACHE TOTAL CAPACITY	43202 CACHE REMAINING CAPACITY
10GB	7.5GB

FIG.8

LOGICAL VOLUME MANAGEMENT TL 4325,5325

43251 LOGICAL VOLUME ID	43252 PATH ID LIST	43253 VOLUME CAPACITY	43254 DATA ARRANGEMENT
vb1	path -b1, path -b3	10GB	PARITY GROUP 0
vb2	path -b2	20GB	PARITY GROUP 1
vb3	path -b4	30GB	PARITY GROUP 2

FIG.9

PATH MANAGEMENT TL 4330,5330

43301 PATH ID	43302 PORT ID	43303 LUN	43304 LOGICAL VOLUME ID
path -b1	port -b1	1	vb1
path -b2	port -b1	2	vb2
path -b3	port -b3	1	vb1
path -b4	port -b3	2	vb3

FIG.10

CACHE ALLOCATION MANAGEMENT TL 4335,5335

43351 LOGICAL VOLUME ID	43352 CACHE ALLOCATION AMOUNT	43353 CACHE RESIDENT AREA
vb1	1GB	300MB (ADDRESS 0 - 153600)
vb2	NO	500MB (ADDRESS 0 - 256000)
vb3	1GB	NO

FIG.11

PORT BANDWIDTH ALLOCATION MANAGEMENT TL 4340,5340

43401 PATH ID	43402 PORT ID	43403 ALLOCATION BANDWIDTH
path -b1	port -b1	100MB /s
path -b2	port -b1	50MB /s
path -b3	port -b3	50MB /s

FIG.12

DEVICE DETECTION LIST 4350

43501 DETECTION OBJECT ID	433502 DEVICE TYPE	43503 DEVICE INFORMATION	43504 IP ADDRESS
vb1	STORAGE	VENDOR	100.100.100.103

FIG.13

CACHE ALLOCATION MIGRATION TL 4355

43551 PROCESSED FLAG	MIGRATION SOURCE CACHE DEFINITION			MIGRATION DESTINATION CACHE DEFINITION		
	43552 LOGICAL VOLUME ID	43558 CACHE ALLOCATION AMOUNT	43553 CACHE RESIDENT AREA	43554 LOGICAL VOLUME ID	43555 CACHE ALLOCATION AMOUNT	43559 CACHE RESIDENT AREA
DONE	vb1	1GB	300MB	va1	1GB	300MB
YET	vb2		500MB	-	-	-
YET	vb3	1GB	NO	-	-	-

FIG.14

MIGRATION DESTINATION CACHE REMAINING CAPACITY MANAGEMENT TL 4360

MIGRATION DESTINATION CACHE REMAINING CAPACITY
9GB

FIG.15

PORT BANDWIDTH ALLOCATION MIGRATION TL 4365

43651 PROCESSED FLAG	43658 MIGRATION SOURCE PORT DEFINITION			43659 MIGRATION DESTINATION PORT DEFINITION		
	43652 PATH ID	43653 PORT ID	43654 ALLOCATION BANDWIDTH	43655 PATH ID	43656 PORT ID	43657 ALLOCATION BANDWIDTH
DONE	path-b1	port-b1	100MB /s	path-a1	port-a1	100MB /s
DONE	path-b2	port-b1	50MB /s	path-a2	port-a1	50MB /s
DONE	path-b3	port-b3	50MB /s	path-a3	port-a3	50MB /s

FIG.16

PATH MIGRATION TL 4370

43701 PROCESSED FLAG	43710 MIGRATION SOURCE PATH DEFINITION				43705 MIGRATION DESTINATION PATH DEFINITION			
	43702 PATH ID	43703 PORT ID	43704 LUN	LOGICAL VOLUME ID	43706 PATH ID	43707 PORT ID	43711 LUN	43708 OGICAL VOLUME ID
DONE	path-b1	port-b1	1	vb1	path-a1	port-a1	1	va1
DONE	path-b2	port-b1	2	vb2	path-a2	port-a1	2	va2
DONE	path-b3	port-b3	1	vb1	path-a3	port-a3	1	va1
YET	path-b4	port-b3	2	vb3	-	-	-	-

43709

FIG.17

MIGRATION DESTINATION PORT BANDWIDTH REMAINING CAPACITY MANAGEMENT TL 4375

43751 PORT ID	43752 PORT BANDWIDTH REMAINING CAPACITY
port-a1	50MB /s
port-a2	200MB /s
port-a3	50MB /s
port-a4	200MB /s

FIG.18

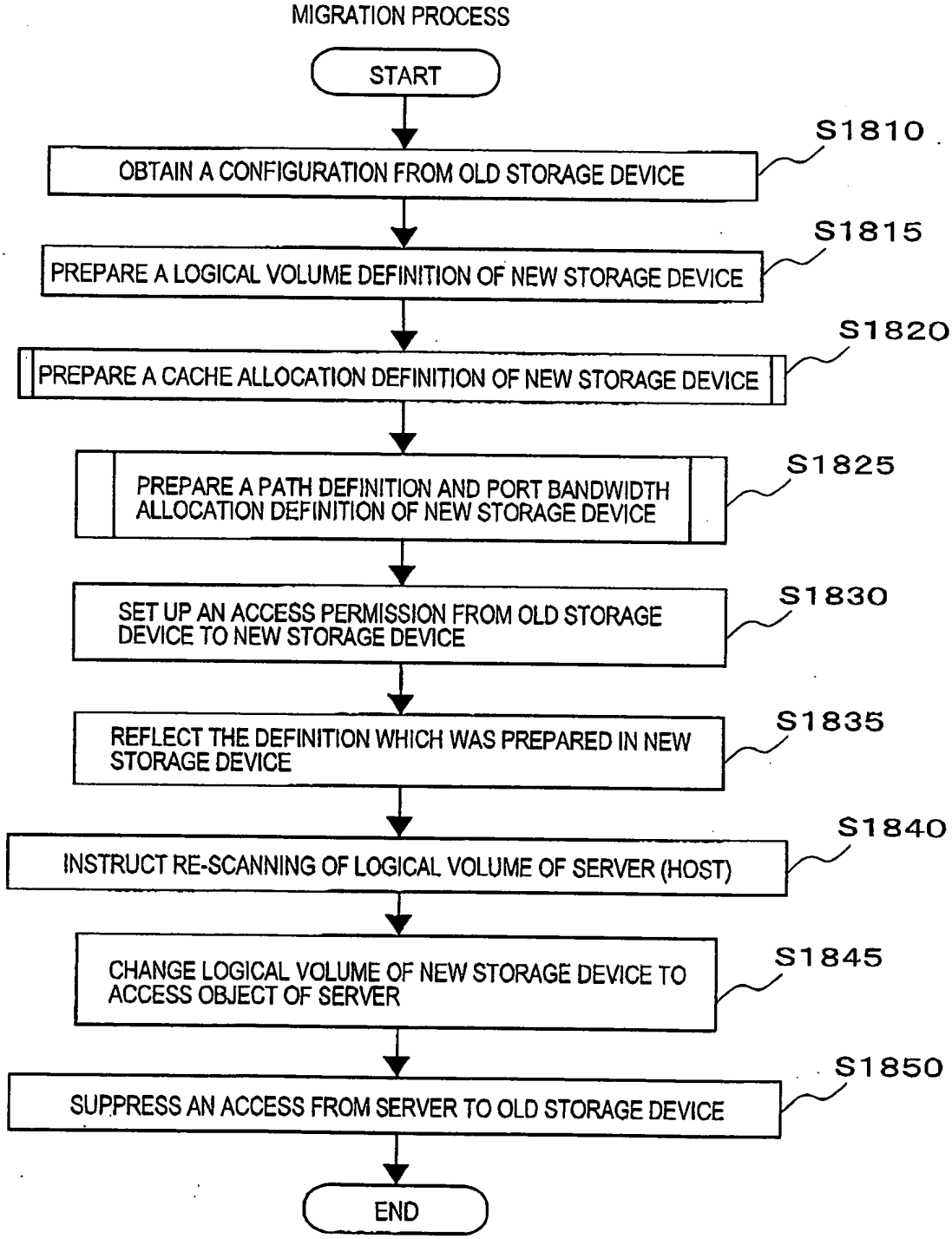

MIGRATION PROCESS
START
OBTAIN A CONFIGURATION FROM OLD STORAGE DEVICE
S1810
PREPARE A LOGICAL VOLUME DEFINITION OF NEW STORAGE DEVICE
S1815
PREPARE A CACHE ALLOCATION DEFINITION OF NEW STORAGE DEVICE
S1820
PREPARE A PATH DEFINITION AND PORT BANDWIDTH ALLOCATION DEFINITION OF NEW STORAGE DEVICE
S1825
SET UP AN ACCESS PERMISSION FROM OLD STORAGE DEVICE TO NEW STORAGE DEVICE
S1830
REFLECT THE DEFINITION WHICH WAS PREPARED IN NEW STORAGE DEVICE
S1835
INSTRUCT RE-SCANNING OF LOGICAL VOLUME OF SERVER (HOST)
S1840
CHANGE LOGICAL VOLUME OF NEW STORAGE DEVICE TO ACCESS OBJECT OF SERVER
S1845
SUPPRESS AN ACCESS FROM SERVER TO OLD STORAGE DEVICE
S1850
END

FIG.19

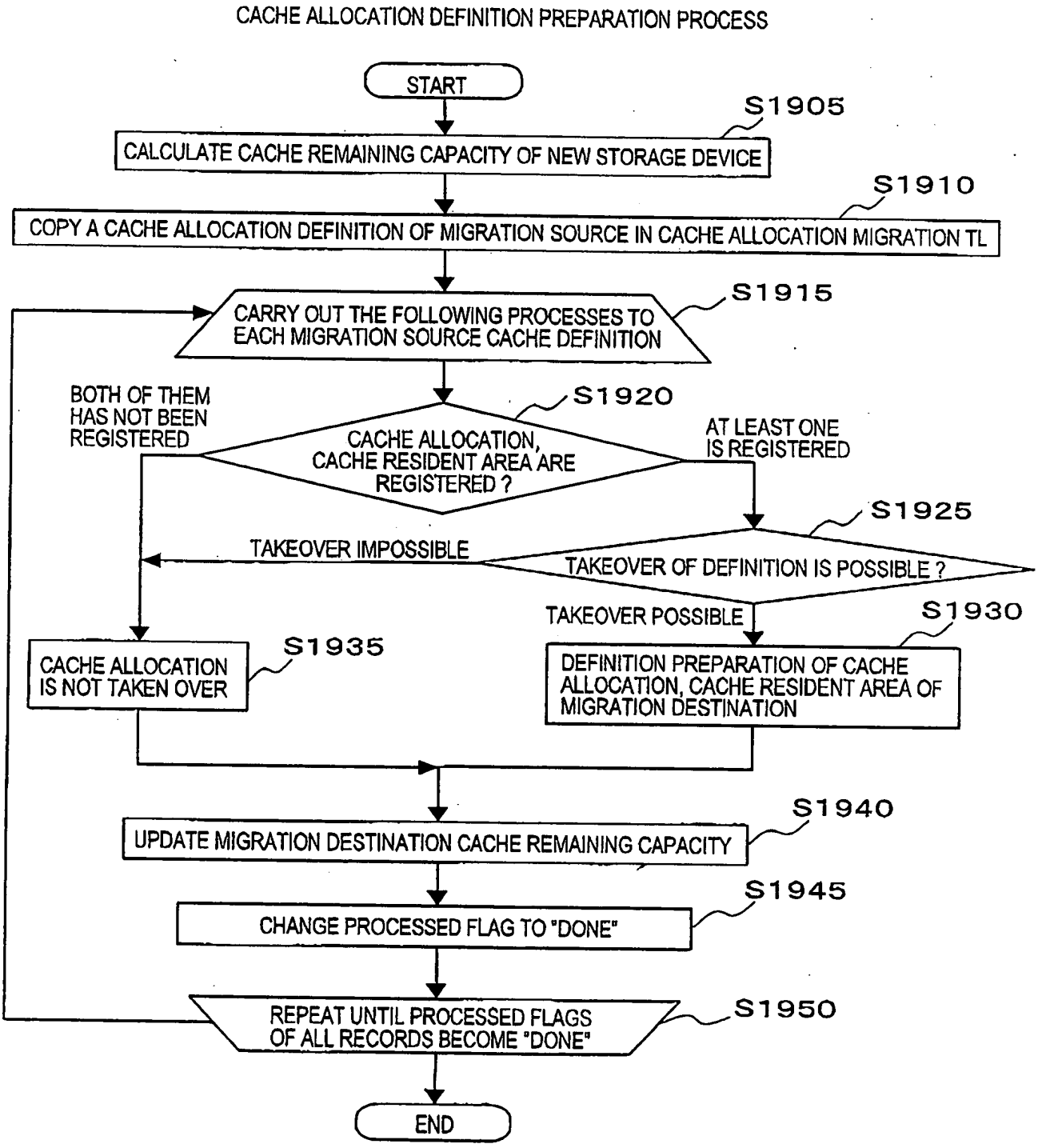

CACHE ALLOCATION DEFINITION PREPARATION PROCESS
START
S1905
CALCULATE CACHE REMAINING CAPACITY OF NEW STORAGE DEVICE
S1910
COPY A CACHE ALLOCATION DEFINITION OF MIGRATION SOURCE IN CACHE ALLOCATION MIGRATION TL
S1915
CARRY OUT THE FOLLOWING PROCESSES TO EACH MIGRATION SOURCE CACHE DEFINITION
BOTH OF THEM HAS NOT BEEN REGISTERED
S1920
CACHE ALLOCATION, CACHE RESIDENT AREA ARE REGISTERED ?
AT LEAST ONE IS REGISTERED
S1925
TAKEOVER IMPOSSIBLE
TAKEOVER OF DEFINITION IS POSSIBLE ?
TAKEOVER POSSIBLE
S1930
CACHE ALLOCATION IS NOT TAKEN OVER
S1935
DEFINITION PREPARATION OF CACHE ALLOCATION, CACHE RESIDENT AREA OF MIGRATION DESTINATION
S1940
UPDATE MIGRATION DESTINATION CACHE REMAINING CAPACITY
S1945
CHANGE PROCESSED FLAG TO "DONE"
S1950
REPEAT UNTIL PROCESSED FLAGS OF ALL RECORDS BECOME "DONE"
END

FIG.20

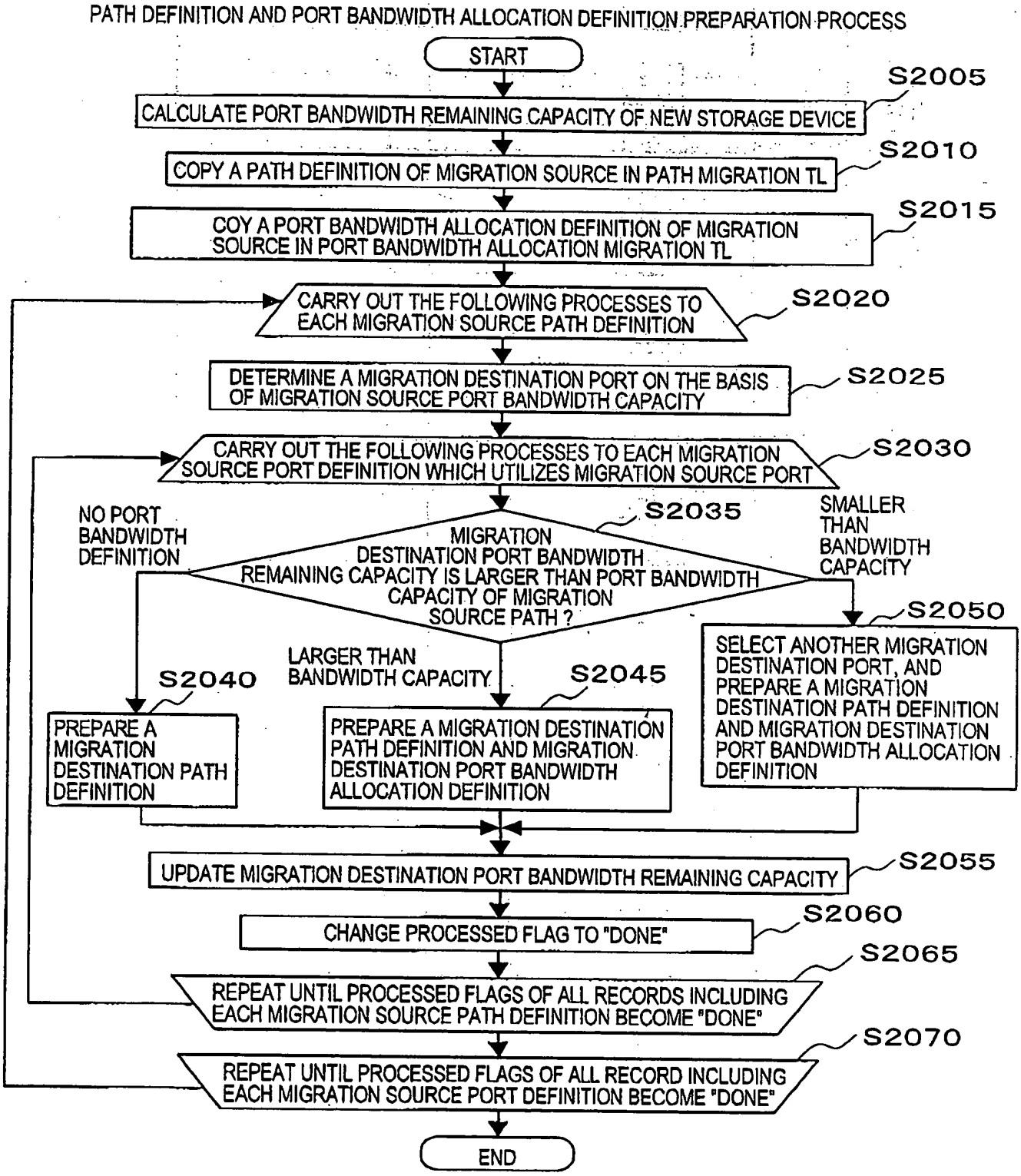

PATH DEFINITION AND PORT BANDWIDTH ALLOCATION DEFINITION PREPARATION PROCESS
START
S2005
CALCULATE PORT BANDWIDTH REMAINING CAPACITY OF NEW STORAGE DEVICE
S2010
COPY A PATH DEFINITION OF MIGRATION SOURCE IN PATH MIGRATION TL
S2015
COY A PORT BANDWIDTH ALLOCATION DEFINITION OF MIGRATION SOURCE IN PORT BANDWIDTH ALLOCATION MIGRATION TL
S2020
CARRY OUT THE FOLLOWING PROCESSES TO EACH MIGRATION SOURCE PATH DEFINITION
S2025
DETERMINE A MIGRATION DESTINATION PORT ON THE BASIS OF MIGRATION SOURCE PORT BANDWIDTH CAPACITY
S2030
CARRY OUT THE FOLLOWING PROCESSES TO EACH MIGRATION SOURCE PORT DEFINITION WHICH UTILIZES MIGRATION SOURCE PORT
S2035
MIGRATION DESTINATION PORT BANDWIDTH REMAINING CAPACITY IS LARGER THAN PORT BANDWIDTH CAPACITY OF MIGRATION SOURCE PATH ?
NO PORT BANDWIDTH DEFINITION
SMALLER THAN BANDWIDTH CAPACITY
LARGER THAN BANDWIDTH CAPACITY
S2040
PREPARE A MIGRATION DESTINATION PATH DEFINITION
S2045
PREPARE A MIGRATION DESTINATION PATH DEFINITION AND MIGRATION DESTINATION PORT BANDWIDTH ALLOCATION DEFINITION
S2050
SELECT ANOTHER MIGRATION DESTINATION PORT, AND PREPARE A MIGRATION DESTINATION PATH DEFINITION AND MIGRATION DESTINATION PORT BANDWIDTH ALLOCATION DEFINITION
S2055
UPDATE MIGRATION DESTINATION PORT BANDWIDTH REMAINING CAPACITY
S2060
CHANGE PROCESSED FLAG TO "DONE"
S2065
REPEAT UNTIL PROCESSED FLAGS OF ALL RECORDS INCLUDING EACH MIGRATION SOURCE PATH DEFINITION BECOME "DONE"
S2070
REPEAT UNTIL PROCESSED FLAGS OF ALL RECORD INCLUDING EACH MIGRATION SOURCE PORT DEFINITION BECOME "DONE"
END

FIG.21

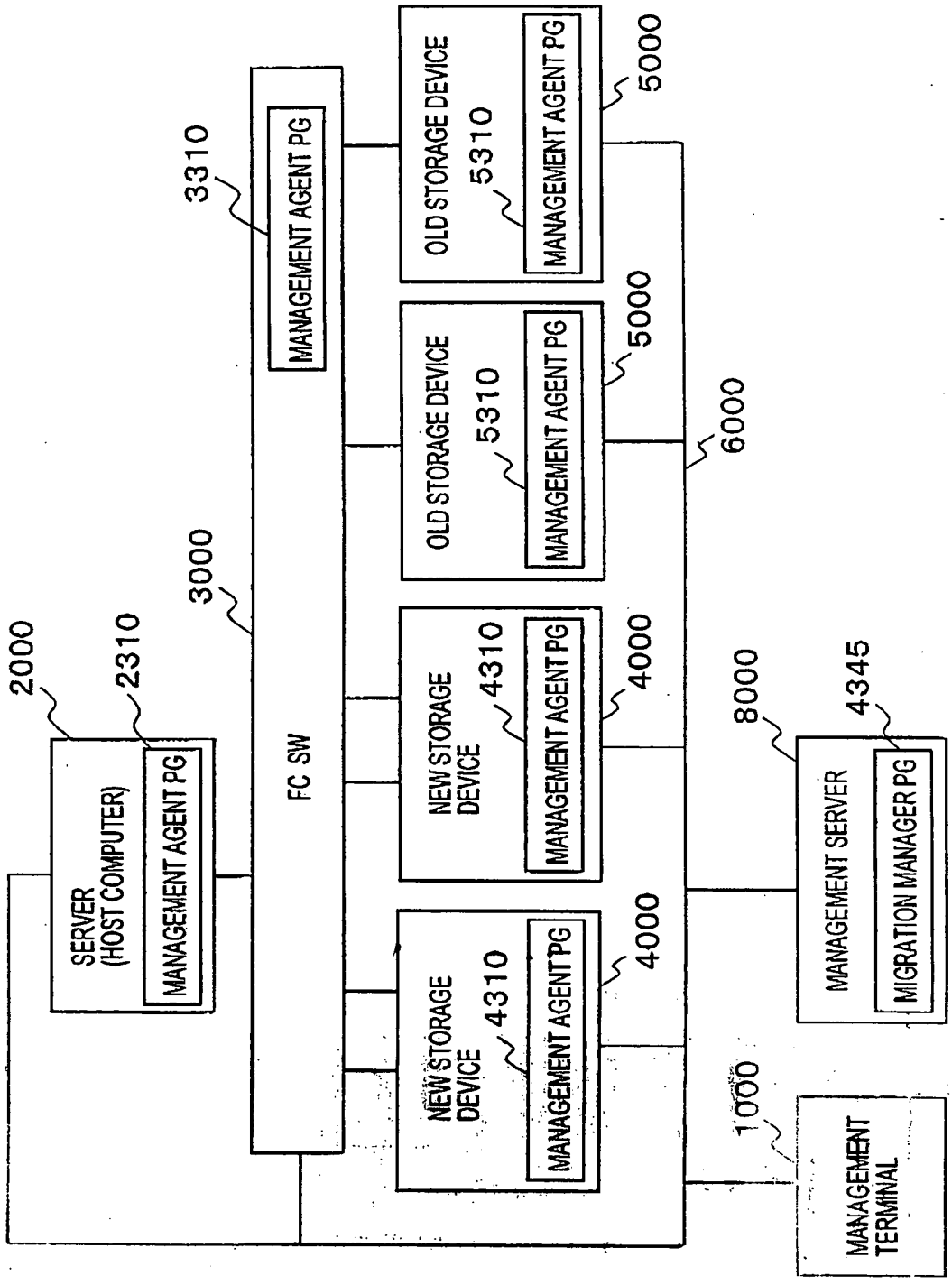

2000
SERVER (HOST COMPUTER)
2310
MANAGEMENT AGENT PG
3000
FC SW
3310
MANAGEMENT AGENT PG
OLD STORAGE DEVICE
5310
MANAGEMENT AGENT PG
5000
OLD STORAGE DEVICE
5310
MANAGEMENT AGENT PG
5000
6000
NEW STORAGE DEVICE
4310
MANAGEMENT AGENT PG
4000
NEW STORAGE DEVICE
4310
MANAGEMENT AGENT PG
4000
8000
MANAGEMENT SERVER
4345
MIGRATION MANAGER PG
1000
MANAGEMENT TERMINAL

FIG.22

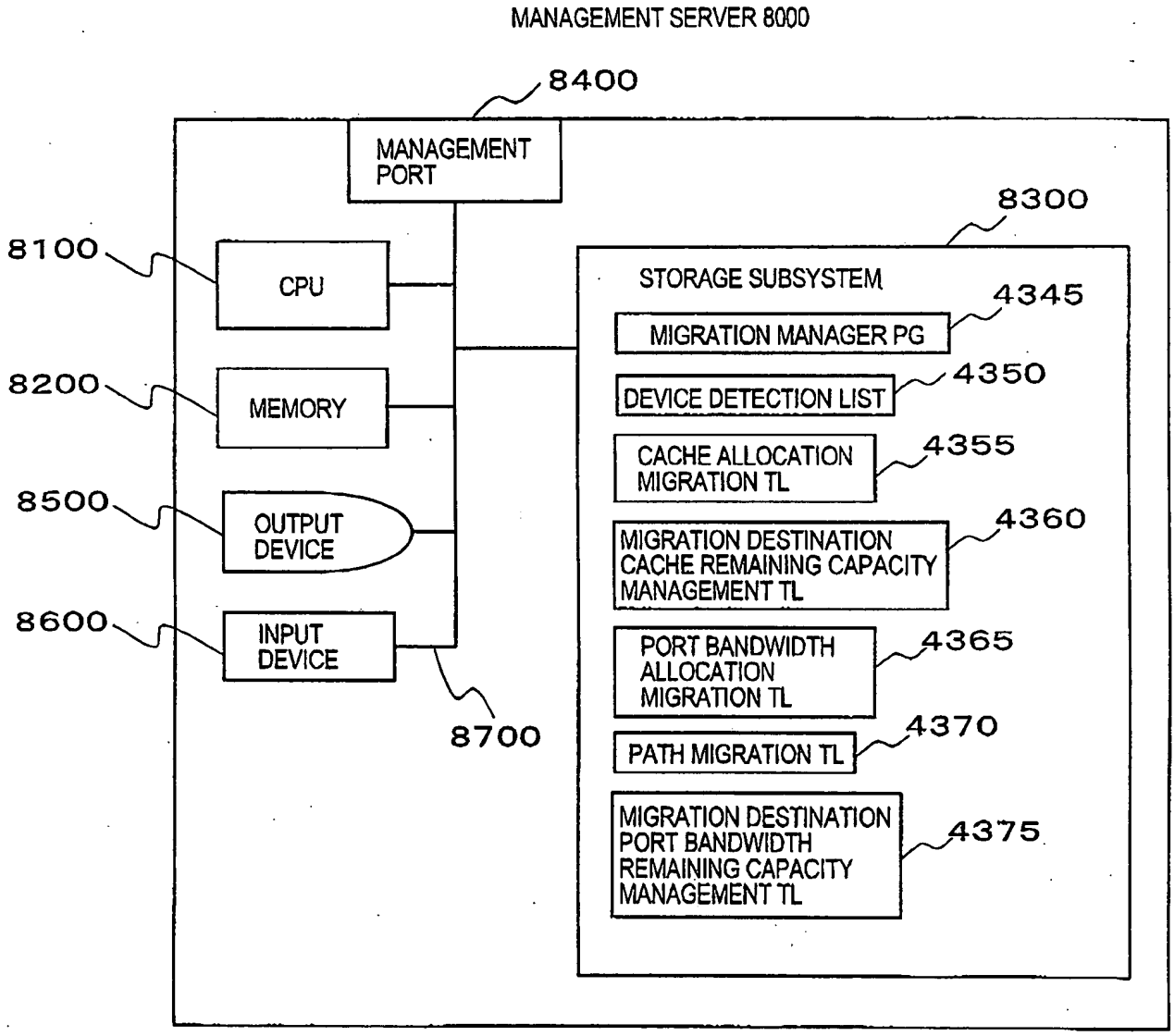

MANAGEMENT SERVER 8000
8400
MANAGEMENT PORT
8300
8100
CPU
STORAGE SUBSYSTEM
4345
MIGRATION MANAGER PG
8200
MEMORY
4350
DEVICE DETECTION LIST
4355
CACHE ALLOCATION MIGRATION TL
8500
OUTPUT DEVICE
4360
MIGRATION DESTINATION CACHE REMAINING CAPACITY MANAGEMENT TL
8600
INPUT DEVICE
4365
PORT BANDWIDTH ALLOCATION MIGRATION TL
4370
PATH MIGRATION TL
8700
4375
MIGRATION DESTINATION PORT BANDWIDTH REMAINING CAPACITY MANAGEMENT TL

FIG.23

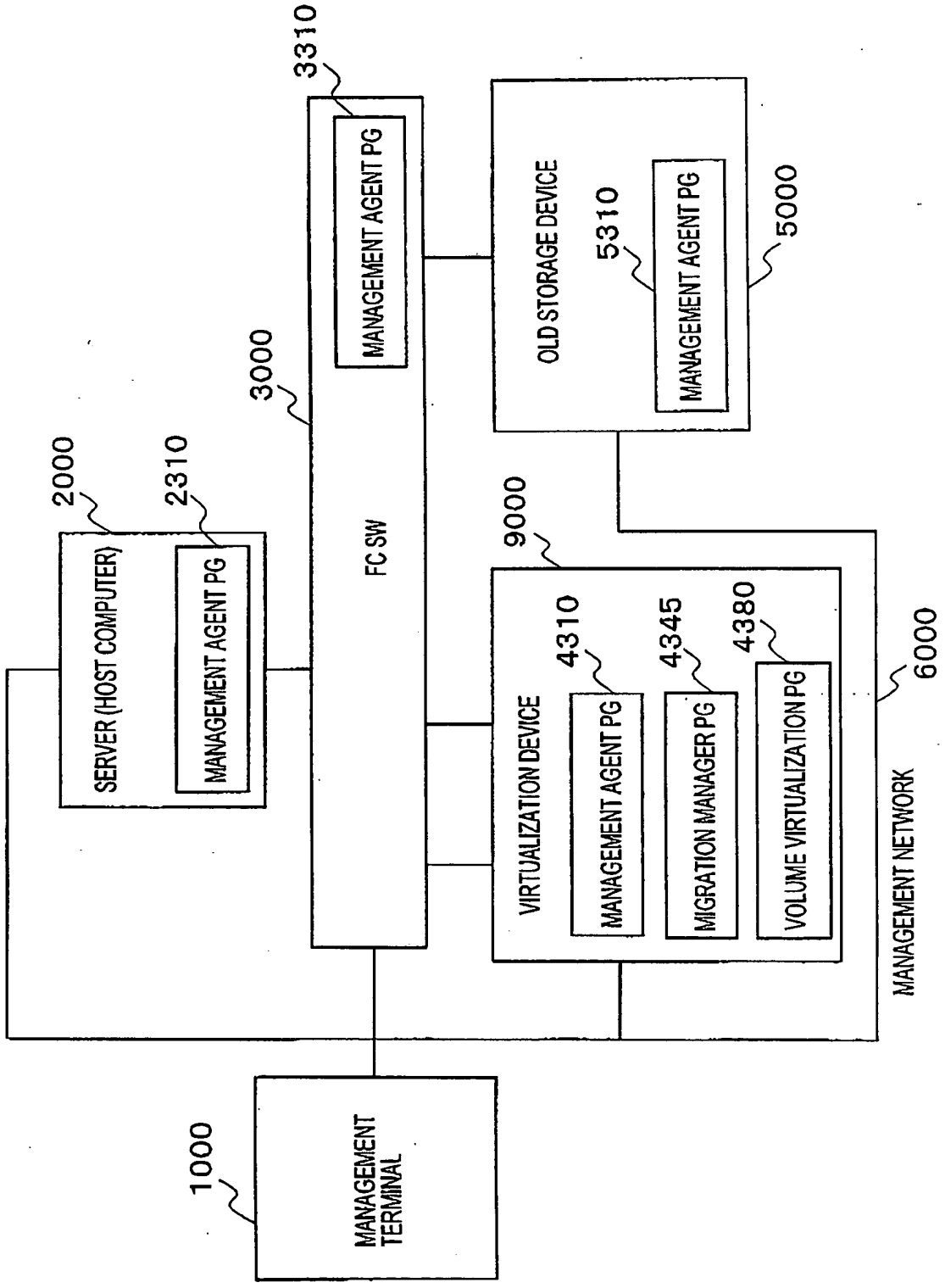

1000
MANAGEMENT TERMINAL
2000
SERVER (HOST COMPUTER)
2310
MANAGEMENT AGENT PG
3000
FC SW
3310
MANAGEMENT AGENT PG
OLD STORAGE DEVICE
5310
MANAGEMENT AGENT PG
5000
9000
VIRTUALIZATION DEVICE
4310
MANAGEMENT AGENT PG
4345
MIGRATION MANAGER PG
4380
VOLUME VIRTUALIZATION PG
6000
MANAGEMENT NETWORK

FIG.24

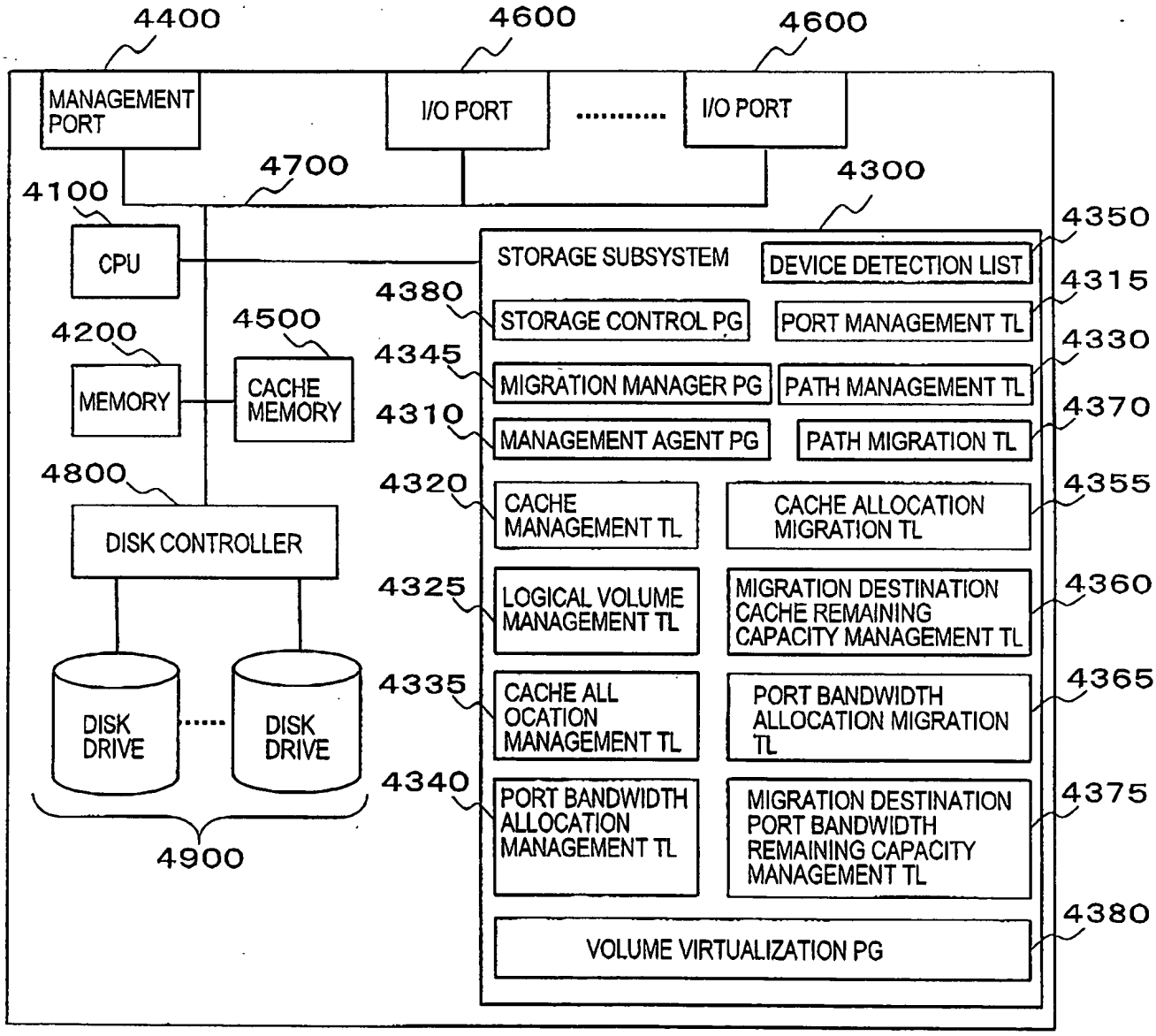

VIRTUALIZATION DEVICE 9000
4400
4600
4600
MANAGEMENT PORT
I/O PORT
I/O PORT
4700
4300
4100
CPU
STORAGE SUBSYSTEM
DEVICE DETECTION LIST
4350
4380
STORAGE CONTROL PG
PORT MANAGEMENT TL
4315
4200
4500
4345
MIGRATION MANAGER PG
PATH MANAGEMENT TL
4330
MEMORY
CACHE MEMORY
4310
MANAGEMENT AGENT PG
PATH MIGRATION TL
4370
4800
4320
CACHE MANAGEMENT TL
CACHE ALLOCATION MIGRATION TL
4355
DISK CONTROLLER
4325
LOGICAL VOLUME MANAGEMENT TL
MIGRATION DESTINATION CACHE REMAINING CAPACITY MANAGEMENT TL
4360
4335
CACHE ALL OCATION MANAGEMENT TL
PORT BANDWIDTH ALLOCATION MIGRATION TL
4365
DISK DRIVE
DISK DRIVE
4340
PORT BANDWIDTH ALLOCATION MANAGEMENT TL
MIGRATION DESTINATION PORT BANDWIDTH REMAINING CAPACITY MANAGEMENT TL
4375
4380
VOLUME VIRTUALIZATION PG
4900

FIG.25

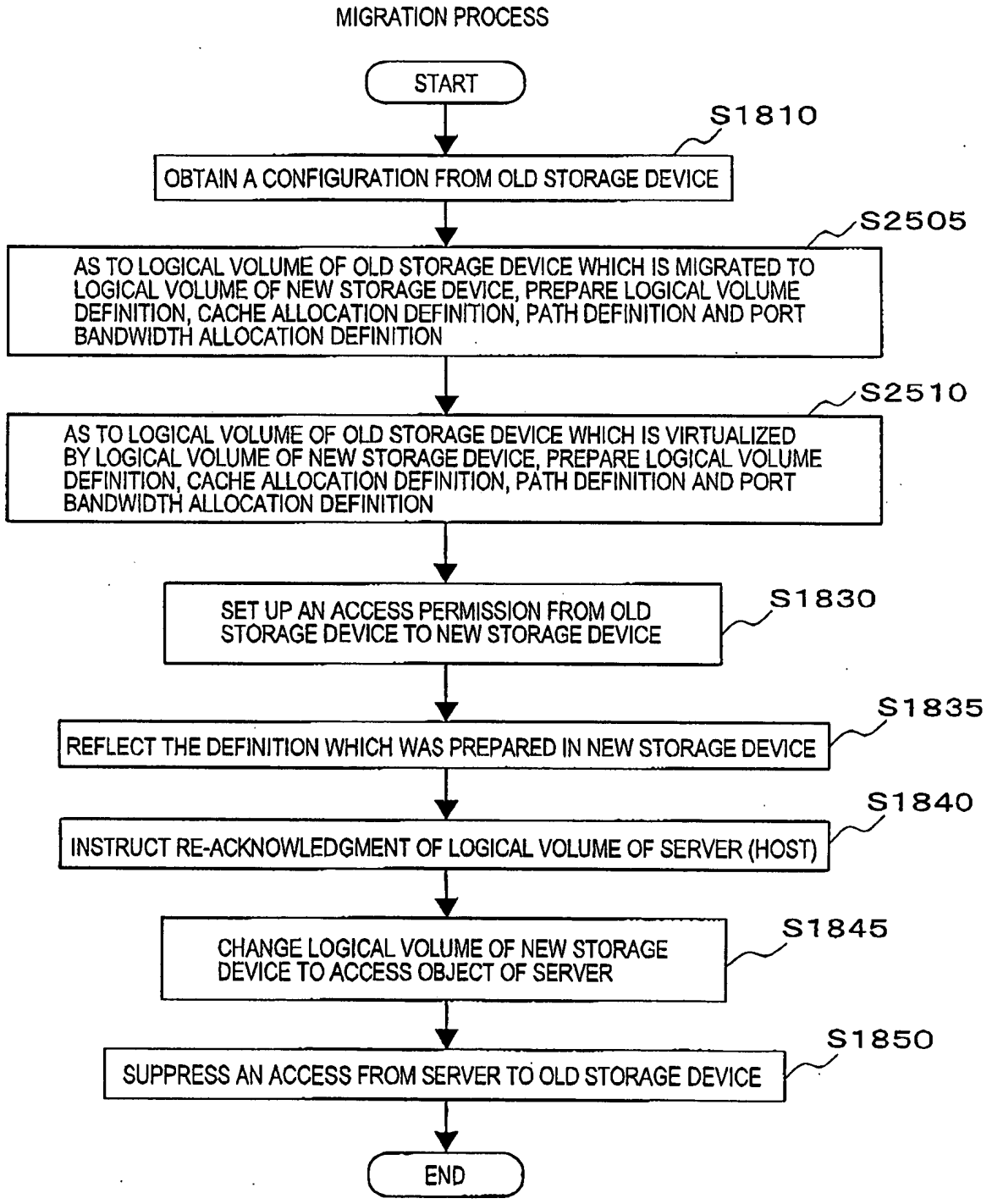
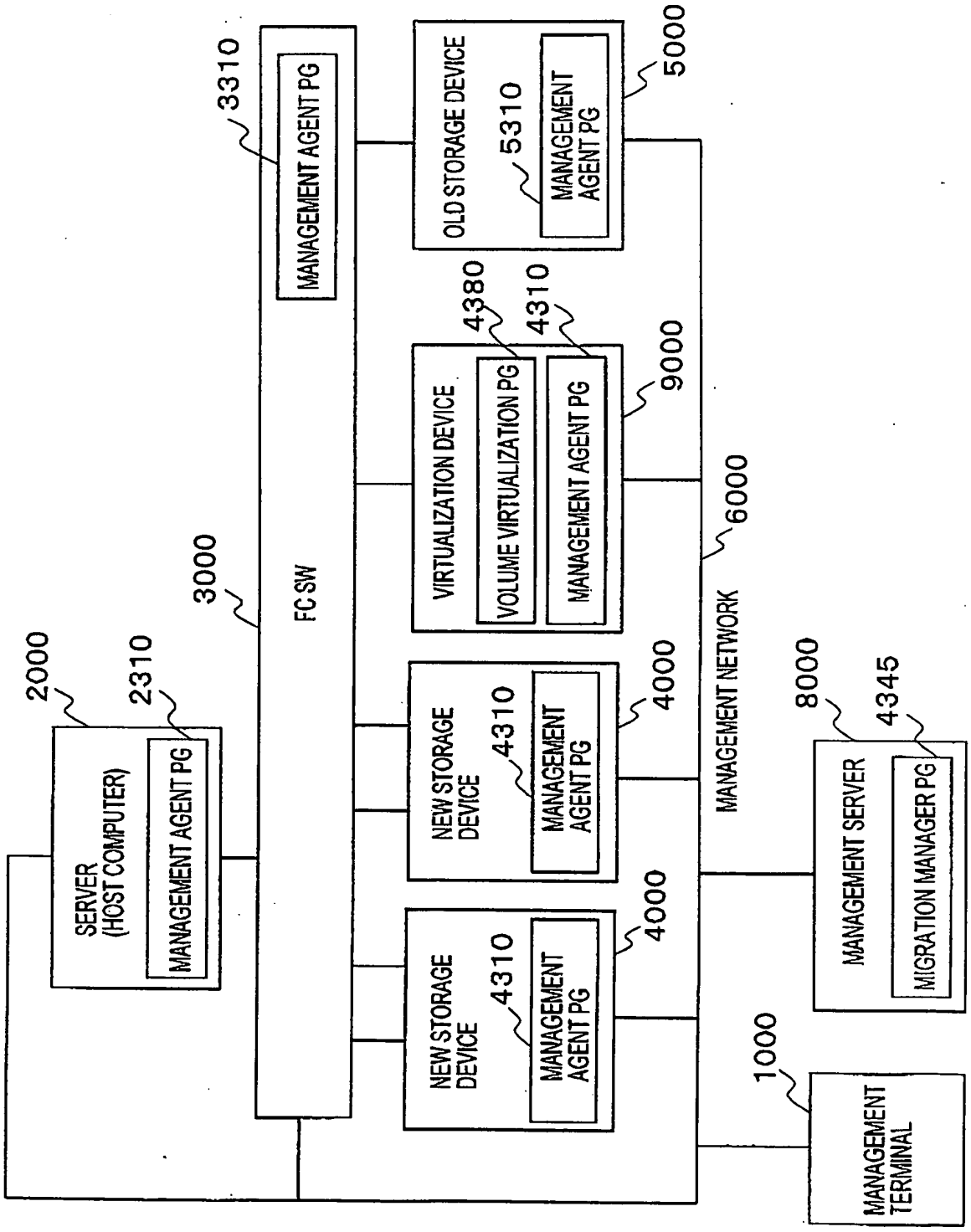

MIGRATION PROCESS
START
S1810
OBTAIN A CONFIGURATION FROM OLD STORAGE DEVICE
S2505
AS TO LOGICAL VOLUME OF OLD STORAGE DEVICE WHICH IS MIGRATED TO LOGICAL VOLUME OF NEW STORAGE DEVICE, PREPARE LOGICAL VOLUME DEFINITION, CACHE ALLOCATION DEFINITION, PATH DEFINITION AND PORT BANDWIDTH ALLOCATION DEFINITION
S2510
AS TO LOGICAL VOLUME OF OLD STORAGE DEVICE WHICH IS VIRTUALIZED BY LOGICAL VOLUME OF NEW STORAGE DEVICE, PREPARE LOGICAL VOLUME DEFINITION, CACHE ALLOCATION DEFINITION, PATH DEFINITION AND PORT BANDWIDTH ALLOCATION DEFINITION
S1830
SET UP AN ACCESS PERMISSION FROM OLD STORAGE DEVICE TO NEW STORAGE DEVICE
S1835
REFLECT THE DEFINITION WHICH WAS PREPARED IN NEW STORAGE DEVICE
S1840
INSTRUCT RE-ACKNOWLEDGMENT OF LOGICAL VOLUME OF SERVER (HOST)
S1845
CHANGE LOGICAL VOLUME OF NEW STORAGE DEVICE TO ACCESS OBJECT OF SERVER
S1850
SUPPRESS AN ACCESS FROM SERVER TO OLD STORAGE DEVICE
END

FIG.26


2000
SERVER (HOST COMPUTER)
2310
MANAGEMENT AGENT PG
3000
FC SW
3310
MANAGEMENT AGENT PG
OLD STORAGE DEVICE
5310
MANAGEMENT AGENT PG
5000
VIRTUALIZATION DEVICE
4380
VOLUME VIRTUALIZATION PG
4310
MANAGEMENT AGENT PG
9000
NEW STORAGE DEVICE
4310
MANAGEMENT AGENT PG
4000
NEW STORAGE DEVICE
4310
MANAGEMENT AGENT PG
4000
6000
MANAGEMENT NETWORK
8000
MANAGEMENT SERVER
4345
MIGRATION MANAGER PG
1000
MANAGEMENT TERMINAL